

**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

B.Sc. DEGREE EXAMINATION – CHEMISTRY

FIFTH SEMESTER – APRIL 2010

**CH 5508 - FUNDAMENTALS OF SPECTRASCOPIY**

Date & Time: 03/05/2010 / 1:00 - 4:00 Dept. No.

Max. : 100 Marks

**PART – A**

**Answer ALL questions.**

**(10 x 2 = 20 marks)**

1. What are the characteristics of electromagnetic radiations?
2. Define the term transition probability.
3. What is signal to noise ratio?
4. What is meant by chemical shift?
5. Calculate the energy of radiation having wavelength 2700 Å°.
6. What is known as finger print region?
7. What is mutual exclusion principle?
8. Define Larmour precession frequency.
9. List the importance of metastable peaks.
10. What is nitrogen rule in Mass spectrometry?

**PART – B**

**Answer any EIGHT questions.**

**(8 x 5 = 40 marks)**

11. What are sources and detectors used in IR Spectroscopy?
12. Discuss the relative population of various transition energy states at different temperatures.
13. Discuss the factors responsible for line widths and intensity of lines in the spectrum.
14. Explain Stokes and Antistokes line.
15. Describe the various types of absorption bands which results in electronic transitions.
16. Differentiate between photcolorimeter and spectrophotometer.
17. Explain the instrumentation of Raman spectrometer.
18. Explain the term chemical shift with examples. What is coupling constant?
19. Explain the <sup>1</sup>H NMR spectrum of ethanol.
20. Describe the important features of the parent ion peak in mass spectral analysis.

21. Explain the principle of mass spectrometry.  
22. State Lambert-Beer's Law. How is it verified?

**PART – C**

**Answer ANY FOUR questions.**

**(4 x 10 = 40 marks)**

23. (a) Explain the principle and instrumentation of Atomic absorption spectroscopy. (6)  
(b) Explain the applications of Flame photometry. (4)
24. Explain the following :  
(a) auxochromes (3)  
(b) Frank-condon principle (4)  
(c) Progressions (3)
25. (a) Differentiate between IR and Raman spectroscopy. (5)  
(b) Explain the applications of IR spectroscopy. (5)
26. (a) Why is TMS used in NMR? (4)  
(b) Discuss the theory of Raman spectroscopy. (6)
27. (a) Discuss the basic instrumentation of NMR spectroscopy. (4)  
(b) How would you differentiate between the following by UV and NMR methods.  
(i) P-nitroaniline and P-dinitrobenzene  
(ii) P-cresol and Benzyl alcohol (6)
28. (a) What is McLafferty rearrangement? Explain with an example. (6)  
(b) Explain with an example how IR spectra can be used to differentiate inter and intra molecular hydrogen bonding (4)

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